

TABLE OF CONTENTS

CHAPTER	TITLE	PAGE
	DECLARATION	ii
	DEDICATION	iii
	ACKNOWLEDGEMENTS	iv
	ABSTRACT	v
	ABSTRAK	vi
	TABLE OF CONTENTS	vii
	LIST OF TABLES	x
	LIST OF FIGURES	xi
	LIST OF APPENDICES	xiii
	LIST OF ABBREVIATIONS	xiv
I	INTRODUCTION	1
	1.1 Background	1
	1.2 Research Problem	3
	1.3 Aim and Objective	4
	1.4 Scope and Limitation	4
II	LITERATURE REVIEW	5
	2.1 Introduction	5
	2.2 Traffic Signal System	6
	2.2.1 Fixed-time System	6
	2.2.2 Vehicle Actuated Signal System	8

2.3	Red Light Running	10
2.3.1	Factor Contribute Red Light Running	11
2.3.1.1	Intersections Characteristic	11
2.3.1.2	Human Factors	15
2.3.1.3	Vehicle Characteristics	18
2.3.1.4	Weather	18
2.4	Dilemma Zone	19
2.4.1	Driver's Dilemma	21
2.4.2	Factors Influencing Driver's Decision	22
2.4.3	Dilemma and Option Zone	23
2.5	Yellow Signal Timing	27
2.5.1	Driver's Response to Yellow Indication	28
2.5.2	Impact of Yellow Duration	29
2.6	Summary	31
III	METHODOLOGY	32
3.1	Introduction	32
3.2	Evaluation Parameters	34
3.3	Speed Data Collection	34
3.3.1	Stopwatch Method	37
3.3.2	Radar Meter Method	38
3.3.3	Pneumatic Road Tube Method	39
3.4	Case Study Site Location	41
3.5	Data Collection Method	44
3.5.1	Data Reduction	45
3.5.2	Chi Square (χ^2) Test	45
3.5.3	Sample Size	46
3.6	Equipment	47
3.7	Summary	49
IV	RESULT AND DISCUSSION	49
4.1	Introduction	49
4.2	Data Analysis	49

	4.2.1 Sample Data Analysis	51
4.3	Evaluation of Existing Installed System	55
	4.3.1 Yellow Interval	55
	4.3.2 Operation Speed	56
4.4	Effect of Dilemma Zones on Red Light Running	56
	4.4.1 Dilemma and Option Zones	57
	4.4.2 Red-Light Running Rate	60
4.5	Effect of Various Type Traffic Signal System on Red-Light Running	61
4.6	Performance of Traffic Signal System Installed	64
V	CONCLUSION	66
	5.1 Introduction	66
	5.2 Findings	66
	5.3 Problem Faced During Study	68
	5.4 Recommendation for Future Research	68
	5.5 Conclusion	69
	REFERENCES	70
	Appendices A - F	77 - 120

LIST OF TABLES

TABLE NO.	TITLE	PAGE
2.1	Red Light Entries	30
3.1	General characteristic of the intersections studied	41
4.1	Weighted average based on traffic composition	51
4.2	Number of vehicles observed	52
4.3	General characteristics of the intersection studied	55
4.4	Descriptive statistic of operation speed	56
4.5	Stopping distance, X_o and clearing distance, X_c at each intersection	59
4.6	Frequency of DZ conflicts at each intersection	62
4.7	Tabulation of χ^2 comparisons between sites	64

LIST OF FIGURES

FIGURE NO.	TITLE	PAGE
2.1	Traffic signal with countdown system	7
2.2	Vehicle approaching signalized intersection at the onset of yellow	10
2.3	Probability of stopping as a function of travel time and control type	13
2.4	Illustration of Dilemma Zone	20
2.5	Dilemma Zone	21
2.6	Formation of a Dilemma Zone	23
2.7	Formation of an Option Zone	25
3.1	Simplified methodology for this study	33
3.2	Stopwatch spot speed study layout	37
3.3	Radar Meter	38
3.4	Example Radar Meter spot speed study layout	39
3.5	Pneumatic Road Tubes	40
3.6	Road tubes and recorder	40
3.7	Site of data collection and case study (Site 1)	42
3.8	Site of data collection and case study (Site 2)	42
3.9	Site of data collection and case study (Site 3)	42

3.10	Site of data collection and case study (Site 4)	43
3.11	Site of data collection and case study (Site 5)	43
3.12	Site of data collection and case study (Site 6)	43
3.13	Illustration of setting up field reference points and digital camera	44
3.14	Equipment used during data collection	49
4.1	Vehicle composition at an onset amber period	50
4.2	The percentage driver's decision at an onset amber	51
4.3	Persimpangan Seri Melaka Road (Site 1)	53
4.4	Johor Jaya Road (Site 2)	53
4.5	Tebrau Road (Site 3)	53
4.6	Tun Aminah Road – Dato' Sulaiman (Site 4)	54
4.7	Gelang Patah Road (Site 5)	54
4.8	Pendidikan Road, Taman Universiti (Site 6)	54
4.9	Critical Distance (X_C) and Stopping Distance (X_0) at Site 3	58
4.10	Critical Distance (X_C) and Stopping Distance (X_0) at Site 1	58
4.11	Critical Distance (X_C) and Stopping Distance (X_0) at Site 4	58
4.12	Critical Distance (X_C) and Stopping Distance (X_0) at Site 5	59
4.13	Critical Distance (X_C) and Stopping Distance (X_0) at Site 6	59
4.14	Critical Distance (X_C) and Stopping Distance (X_0) at Site 2	59
4.15	Frequency of DZ conflicts based on types of traffic signal installed	61

LIST OF APPENDICES

APPENDIX	TITLE	PAGE
A	Data Collection in Persimpangan Seri Melaka Road (Site 1)	77
B	Data Collection in Johor Jaya Road (Site 2)	83
C	Data Collection in Tebrau Road (Site 3)	89
D	Data Collection in Tun Aminah Road – Dato’ Sulaiman (Site 4)	103
E	Data Collection in Gelang Patah Road (Site 5)	111
F	Data Collection in Pendidikan Road, Taman Universiti (Site 6)	116

LIST OF ABBREVIATIONS

AASTHO	American Association of State Highway and Transportation Officials American
DZ	Dilemma Zone
CDS	Crashworthiness Data System
CD	Compact Disk
FHWA	Federal Highway Administration
GHM	Gazis, Herman and Maradudin
ITE	Institute of Transportation Engineer
JKR	Jabatan Kerja Raya
km/h	Kilometer per hour
m	Metre
m/s	Metre per second
NHTSA	National Highway Traffic Safety Administration
PRT	Perception Reaction Time
RRL	Run Red Light
s	Second
UFOV	Useful Field Of View
X_0	Stopping Distance
X_C	Critical Distance
χ^2	Chi Square